Modeling of Complex Parison Formation in Extrusion Blow Molding: Effect of Medium to Large Die Heads and Fuel Tank Geometry

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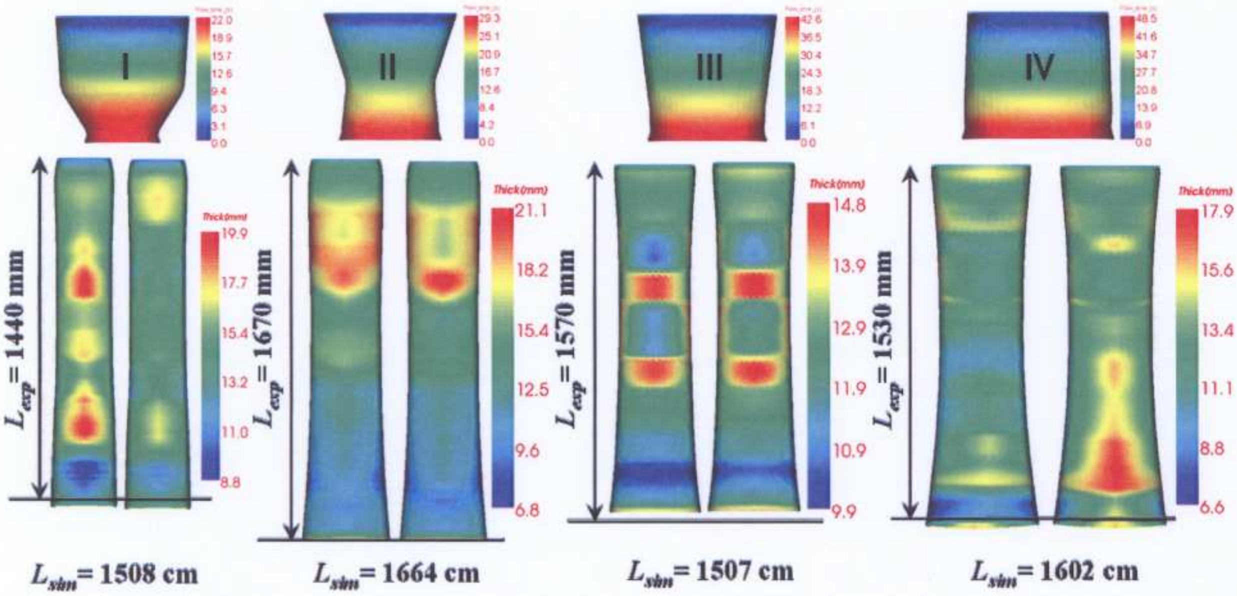
ABSTRACT

In extrusion blow molding, the complexity of part geometry could dictate the use of advanced manufacturing technologies to meet the target part thickness requirements. As the parison thickness has a highly non-linear relationship with die gap opening due to the extrudate swell phenomenon, a considerable amount of time, cost and skill is required to get the desired parison dimensions upon any variations in die geometry and operating conditions, in particular for complex parison formation using the vertical wall distribution system (VWDS) and partial wall distribution system (PWDS). Hence the accurate assessment of tooling requirement using predictive techniques is imperative to minimize the costs and customer delivery time. In this work, the *BlowParison*© software from IMI is used to predict the parison formation accounting for swell, sag, and non-isothermal effects. Since the accurate prediction of parison formation is the key step to the proper modeling of the remaining process phases, emphasis is placed on experimental validation of the predicted parison dimensions using four diverging die geometries and different sets of VWDS/PWDS profiles. The experimental and predicted weight profiles for a dissected fuel tank are also presented. The results demonstrate the validity of the numerical predictions for part design purposes.



Front and back views of the simulated parison formation, with swell and sag, using *BlowParison*© software for the four dies, respectively. The scale bar shows the final parison thickness distribution.